

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) IN DRINKING WATER



Washington State Department of Health
Office of Drinking Water

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OFFICE OF DRINKING WATER

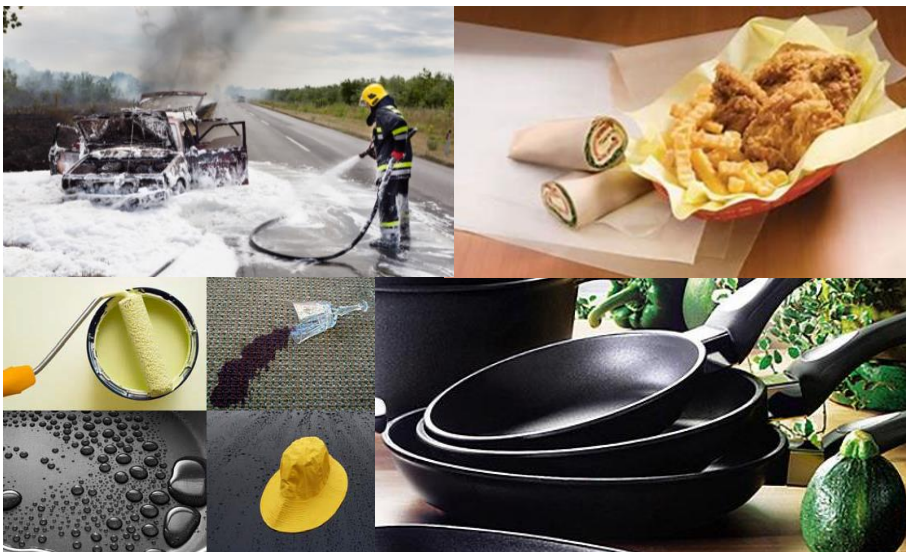
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Welcome, Introductions, and Logistics

- Time for **Questions & Answers** (Q&A) has been set aside following each presenter.
- Use the **chat feature** to ask questions during each Q&A portion of the presentation.
 - Send questions or comments not answered (or that you'd like on the record) for the **PFAS rule** to PFAS@DOH.WA.GOV.
 - Send questions or comments not answered (or that you'd like on the record) for the **Lab rule** to LABRULE@DOH.WA.GOV.

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PFAS - Common Uses



Potential Sources of PFAS in Drinking Water

Aqueous film-forming foams (AFFF): Military sites, fire training centers, AFFF spill sites, civilian airports

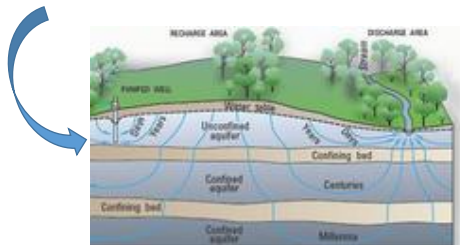
Manufacturing plants, industrial use sites, waste water treatment plants, land fills



How does PFAS in foam get into drinking water?



Runoff to surface water

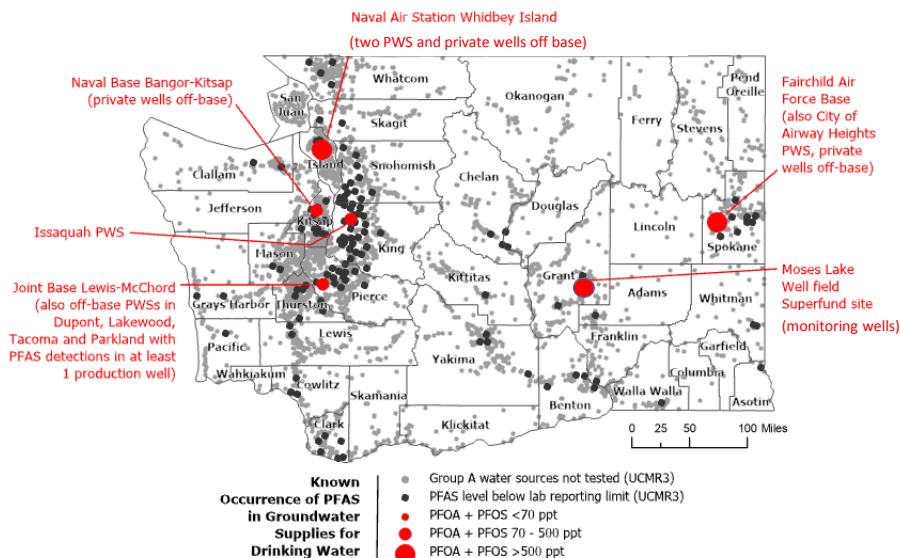


Leach into groundwater

PFAS in the News



Known Occurrence of PFAS in Drinking Water Supplies





Statewide Chemical Action Plan for PFAS

Draft Recommendations

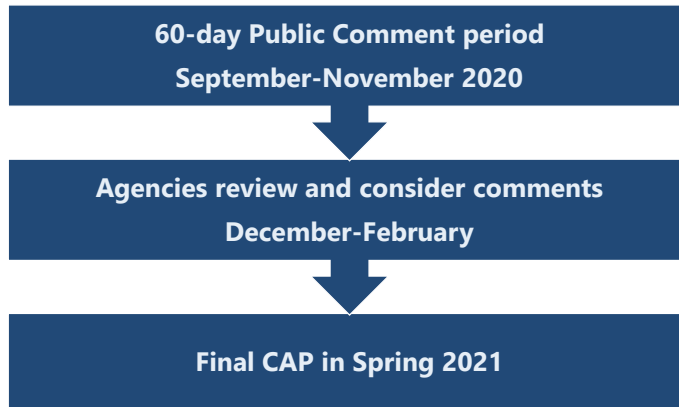
Ensure safe drinking water

Manage environmental contamination

Reduce PFAS in products

Understand and manage PFAS in waste

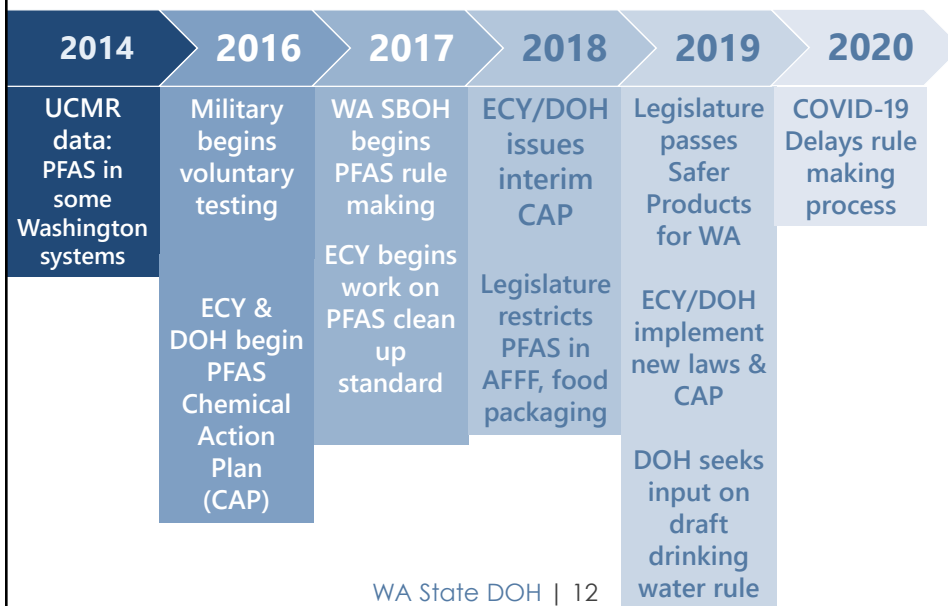
Statewide Chemical Action Plan (CAP) Next Steps



More info at ECY website: <https://www.ezview.wa.gov/?alias=1962&pageid=37105>

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Washington State Action



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State Board of Health: Rulemaking



Petition to set state
PFAS drinking water
standards

SBOH
accepted
petition
Oct 2017

Considerations

- SAL vs. MCL
- Which PFAS to include?
- Action levels?
- Addressing PFAS mixtures
- Update the Lab Rule

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Questions?

✓ Use the chat box.

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Health Concerns

**Toxicity observed in
laboratory animals:**



- Liver toxicity
- Developmental toxicity
- Reproductive toxicity
- Reduced immune response to vaccines.
- Reduced thyroid hormone levels
- Increased occurrence of tumors in liver, pancreas, testes

**In humans, PFAS exposure is
associated with:**



- Increased cholesterol levels
- Increased serum liver enzyme levels
- Reduced immune response to vaccines
- Reduced growth and altered development
- Blood pressure problems during pregnancy
- Increase risk of thyroid disease
- Increased risk of cancer (kidney and testicular)

Approach to Deriving the SALs for PFAS



- Build from existing high quality toxicological assessments (EPA, ATSDR, U.S. States).
- Review newer toxicity studies and epidemiological findings.
- Prioritize PFAS detected in WA State drinking water with sufficient tox info.
- Protect against the most sensitive effect, protect the most sensitive lifestage.



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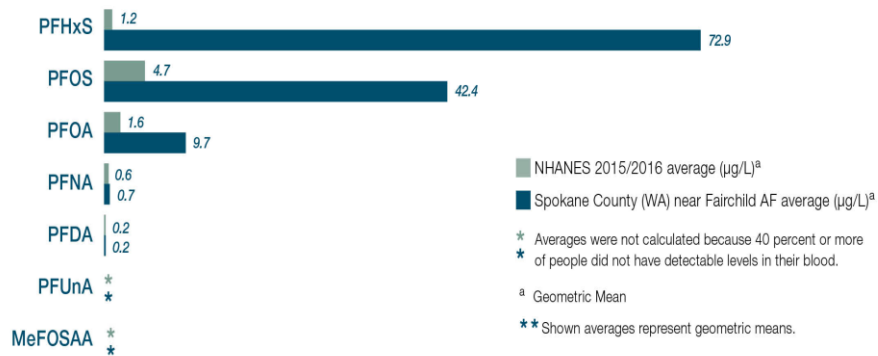
Recommended Health Protective Values and State Action Levels (Sals)

PFAS	RfD/MRL (ug/kg-day)	Source (year)	Basis	Relative Source Contribution	Ingestion rate	SAL in drinking water
PFOA	3	ATSDR MRL (2018)	Developmental effects in mice.	50%	MDH model ^a	10 ng/L
PFOS	3	MDH, NHDES ^b RfD (2019)	Immune effects in mice. Also protective of developmental effects in rats.	20% Adults 50% infants	MDH model ^a	15 ng/L
PFNA	3	ATSDR MRL (2018)	Developmental effects in mice.	50%	MDH model w/ MDHHS inputs ^c	14 ng/L
PFHxS	9.7	MDH RfD (2019)	Reduced thyroid hormone (T4) in rats (developmental concern). ^d	50%	MDH model ^a	70 ng/L
PFBS	300	EPA RfD 2018 (w/MDH 2019 DAP) ^e	Reduced thyroid hormone (T4) in mice (developmental concern). ^c	50%	0.174 L/kg-d	860 ng/L

Bioaccumulation

ATSDR Exposure Assessment, Airway Heights, WA

PFAS Levels in Blood Compared to National Averages**

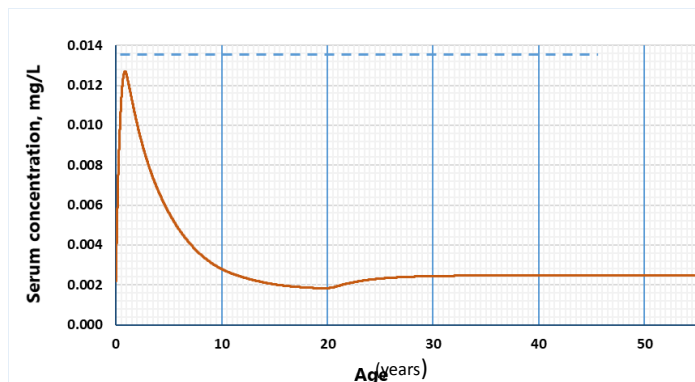


Source: atsdr.cdc.gov/pfas/communities/factsheet/Spokane-County-Community-Level-Results-Factsheet

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Infant Exposure Model

PFOA serum level of breastfed infant resulting from 10 ppt PFOA in community drinking water



Adapted from MDH Model - Goeden et al (2019) J Expos Sci & Environ Epidemiol 29:183-195.

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SALs are Health Protective

A level in water expected to be without appreciable health effects over a lifetime of exposure, this includes sensitive groups.



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Draft SALs for PFAS in Drinking Water

Contaminant	Draft SAL (parts per trillion)	Revised SAL (parts per trillion)
PFOA	10	10
PFOS	15	15
PFNA	14	14
PFHxS	70	70
PFBS	1,300	860

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PFBS SAL Revision (Detail)

Life stage	Drinking water Intake rate (L/kg-day) ^a	Relative Source contribution or RSC (%)	(RfD ^b /DW intake)*RSC=SAL (mg/L)
Infants (<1 year)	0.174 (95 th)	50	0.000862
1 to <2 years old	0.049 (90 th)	20	0.001224
2 to <3 years old	0.051 (90 th)	20	0.001176
3 to <6 years old	0.039 (90 th)	20	0.001538
Pregnant women	0.038 (95 th)	20	0.001579
Lactating women	0.047 (95 th)	20	0.001276

^a Intake rates from 2019 EPA Exposure Factors Handbook Chapter 3

^b RfD = Reference Dose which is 0.0003 mg/kg-day for PFBS

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Other Comments on Draft SALs

- Regulating PFAS as a Class
- Addressing Mixtures of PFAS
- Technical comments about uncertainty factors, best critical study, critical effect.

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Questions?

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Initial Monitoring Requirements for PFAS

**Community &
nontransient
noncommunity
water systems**

Initial and ongoing
monitoring requirements for
PFAS once every three years

**Transient
noncommunity
water systems
(e.g. campsite,
corner store)**

Monitor only if located near
known or suspected sites of
PFAS contamination-as
directed by DOH

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Increase Monitoring Requirements (What Happens After an Initial Detection)

If quarterly results are:

Low

2 total quarters
of increased
monitoring

Medium

3 total quarters
of increased
monitoring

High

4 total quarters
of increased
monitoring

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Ongoing Monitoring Frequency (Following Increased Monitoring)

If results from last year are:

Low

1 time every
3 years

Medium

Annually

High

Quarterly

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Six Other Draft SALs in Drinking Water

Contaminant	Draft SAL (ppb)	Test Panel
DCPA acid metabolites	85	herbicide
Bromomethane	5	VOC
Dichlorodifluoromethane	530	VOC
Trichlorofluoromethane	1,300	VOC
Naphthalene	14	VOC
1,2,3-Trichloropropane	21	VOC

Public Notice Requirements

Water Systems that exceed a SAL

Inform customers about the health effects of the contaminant

What they are doing to address the issue

What consumers can do to reduce their exposure

Community water systems with a detection

Include information on detected PFAS in their annual consumer confidence report



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Guidance and Support



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Questions?

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Technical Changes

Updated definitions to include PFAS terminology and units of measure

Added requirements about PWS notification when subcontracting out samples

Added after hours contact information

Changed chronic contaminant reporting from 45 business days to 30 calendar days.

Lowered chloride from 20mg/L to 2mg/L

Lowered sulfate from 50mg/L to 2mg/L

Removed fluoranthene reporting requirements

Updated enforcement terminology to follow new ODW guidelines

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Changes to Notifications

Sample type	Exceeds	*Required Notification	Required Number of Attempts to Contact the Department
Routine, repeat, triggered, and assessment water coliform samples	Total Coliform Positive and <i>E. coli</i> positive	Close of business same day	3
Routine, repeat, triggered, and assessment water coliform samples	Total Coliform Positive and <i>E. coli</i> negative	Close of business **next business day	1
Routine or confirmation samples nitrate or nitrite	State or Federal MCL under chapters 246-290 and 246-291 WAC	Close of business Same day	3
Routine or confirmation sample results for other inorganic sample results not mentioned above, organic, or radiological contaminant	4 Times the State primary or Federal MCL under chapters 246-290 and 246-291 WAC	Close of business same day	1

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PFAS Specific Changes

Only EPA methods 537.1 and 533 will be allowed to be used when analyzing for PFAS contaminants

Labs will report any result above established SDRL

Any Tentatively Identified Compounds must be reported to ODW

**All SDRLs are 2 ng/L except for the two below which are 3 ng/L
(NEtFOSAA) N-ethyl perfluorooctanesulfonamidoacetic acid
(NMeFOSAA) N-methyl perfluorooctanesulfonamidoacetic acid**

Only contaminants that are can be analyzed by both methods are required to reported for compliance

All additional contaminants that each method can test for must be reported to ODW if a waiver is to be granted

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Required Contaminants

DOH #	CONTAMINANT	DATA QUALIFIER	RESULTS	SDRL	SAL	UNITS	EXCEEDS SAL? (X if Yes)	METHOD/ INITIALS
0434	(PFOA) Perfluorooctanoic acid			2	10	ng/L		
0433	(PFOS) Perfluorooctanesulfonic acid			2	15	ng/L		
0431	(PFHxS) Perfluorohexanesulfonic acid			2	70	ng/L		
0432	(PFNA) Perfluorononanoic acid			2	14	ng/L		
0429	(PFBS) Perfluorobutanesulfonic acid			2	860	ng/L		
0430	(PFHpA) Perfluoroheptanoic acid			2	n/a	ng/L		
0435	(PFHxA) Perfluorohexanoic acid			2	n/a	ng/L		
0436	(PFDA) Perfluorodecanoic acid			2	n/a	ng/L		
0437	(PFUnA) Perfluoroundecanoic acid			2	n/a	ng/L		
0438	(PFDoA) Perfluorododecanoic acid			2	n/a	ng/L		
0445	(ADONA) 4,8-Dioxa-3H-perfluorononanoic acid			2	n/a	ng/L		
0446	(9Cl-PF3ONS) 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid			2	n/a	ng/L		
0447	(HFPO-DA) Hexafluoropropylene oxide dimer acid			2	n/a	ng/L		
0448	(11Cl-PF3OUdS) 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid			2	n/a	ng/L		

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Additional Contaminants

**Additional EPA 537.1 Contaminants

DOH #	CONTAMINANT	DATA QUALIFIER	RESULTS	SDRL	SAL	UNITS	EXCEEDS SAL? (X if Yes)	METHOD/ INITIALS
0439	(PFTrDA) Perfluorotridecanoic acid			2	n/a	ng/L		
0440	(PFTA) Perfluorotetradecanoic acid			2	n/a	ng/L		
0441	(NEtFOSAA) N-ethyl perfluorooctanesulfonamidoacetic acid			3	n/a	ng/L		
0442	(NMeFOSAA) N-methyl perfluorooctanesulfonamidoacetic acid			3	n/a	ng/L		

**Additional EPA 533 Contaminants

DOH #	CONTAMINANT	DATA QUALIFIER	RESULTS	SDRL	SAL	UNITS	EXCEEDS SAL? (X if Yes)	METHOD/ INITIALS
0450	(4:2FTS)1H,1H, 2H, 2H-Perfluorohexane sulfonic acid			2	n/a	ng/L		
0451	(6:2FTS)1H,1H, 2H, 2H-Perfluorooctane sulfonic acid			2	n/a	ng/L		
0452	(8:2FTS)1H,1H, 2H, 2H-Perfluorodecane sulfonic acid			2	n/a	ng/L		
0453	(NFDHA)Nonafluoro-3,6-dioxahexanoic acid			2	n/a	ng/L		
0454	(PFBA)Perfluorobutanoic acid			2	n/a	ng/L		
0455	(PFHpS)Perfluoroheptanesulfonic acid			2	n/a	ng/L		
0456	(PFMBA)Perfluoro-4-methoxybutanoic acid			2	n/a	ng/L		
0457	(PFMPA)Perfluoro-3-methoxypropanoic acid			2	n/a	ng/L		
0458	(PFPeA)Perfluoropentanoic acid			2	n/a	ng/L		
0459	(PFPeS)Perfluoropentanesulfonic acid			2	n/a	ng/L		
0460	(PFEEA)Perfluoro(2-ethoxyethane)sulfonic acid			2	n/a	ng/L		

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PFAS Specific Notifications

Routine or confirmation sample results for contaminants that exceed the SAL or state MCL under WAC 246-290-315 and classified as Tier 1, Tier 2 bioaccumulative, or tier 2 non-bioaccumulative under WAC 246-290-71006, Table 17

Tier Number	Bioaccumulative (Y/N)	Exceeds	*Required Notification	Required Number of attempts to Contact the Department
Tier 1	Both	SAL or State MCL	Close of business same day	3
Tier 2	Y	4 Times SAL or State MCL	Close of business same day	3
Tier 2	Y	SAL or State MCL	Close of business **next business day	1
Tier 2	N	4 Times SAL or State MCL	Close of business same day	1

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Types of Comments Received

DOH should develop an MCL—not an SAL

Treatment is expensive and funding should be addressed.

Technical comments related to monitoring descriptions, definitions, references

Need to update Lab Rule

Regulate as a mixture not individually

What if/when a federal MCL is adopted

Differing requirements based on size and type of system

Public notification concerns

Need for guidance documents

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MCL Considerations

Concerns that an MCL is needed for funding

Want the certainty of an MCL

SBOH considerations for starting with SAL

Want the process of MCL development in rule

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Funding Treatment for PFAS

PFAS contamination is an eligible condition for SRF funding

Ecology continues to work on grant funding and will move forward w/cleanup standards once SAL is in rule

This imposes both state and federal requirements for responsible parties to address contamination

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What Happens When EPA Adopts MCL ?

State SAL is superseded

DOH evaluation to determine if MCL is protective enough for SBOH decision

SBOH will start rulemaking for State MCL if determined necessary

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Draft Rule Changes Based on Comments

Changed PFBS SAL to address concern about infant exposure

Included **process** to adopt MCLs

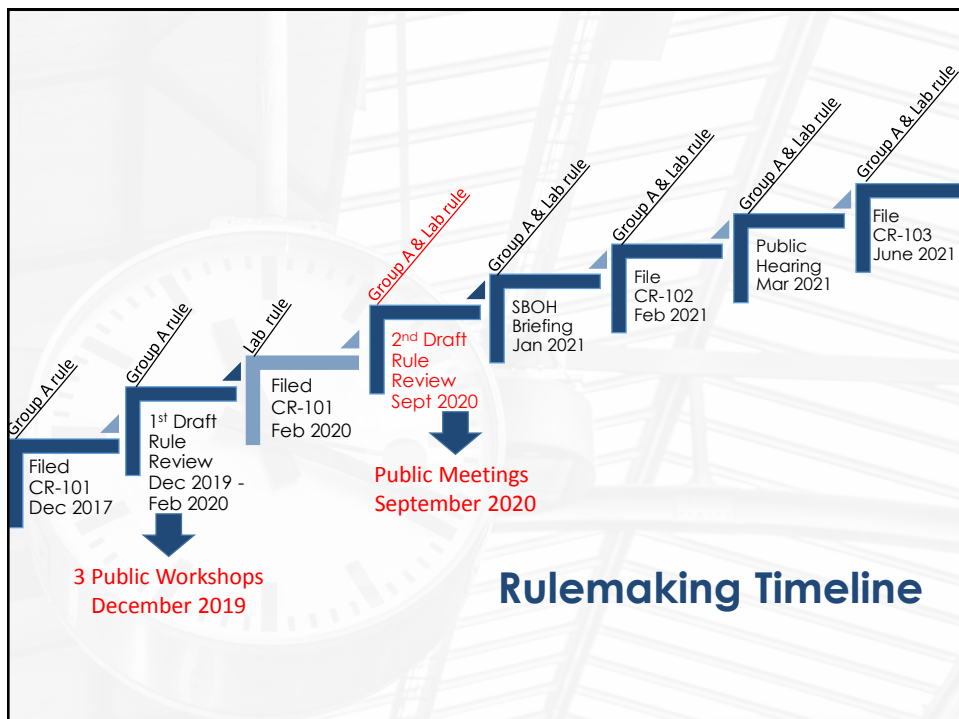
Addressed what happens if/when EPA sets MCL

Made technical corrections & clarifications in rule

Clarified PN to be more like Tier 2

Developed draft Lab Rule language

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